June 11, 1957 E. KELLER ET AL 2,795,660

SWITCH FOR HIGH FREQUENCY CIRCUIT

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FIG. 1

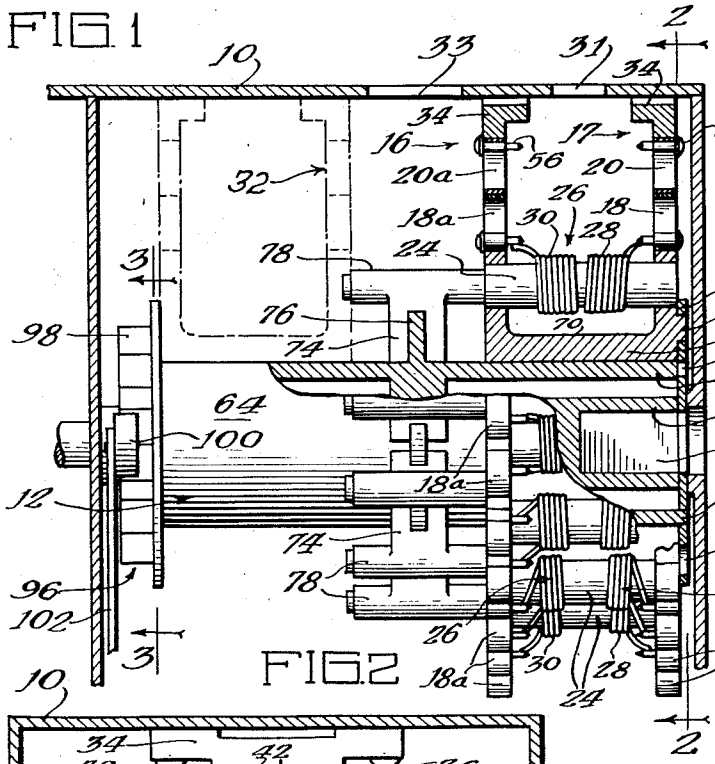


FIG. 2

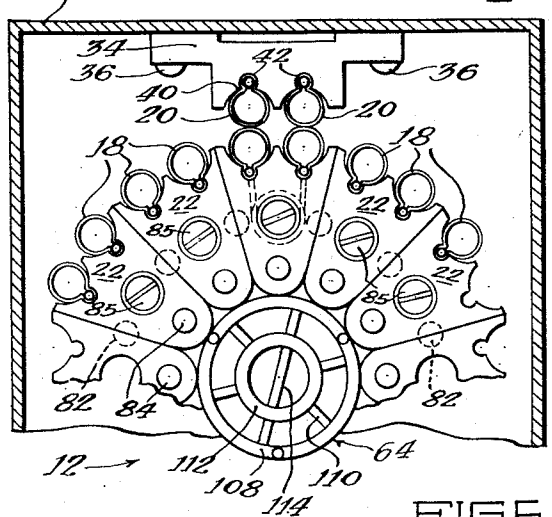


FIG. 3

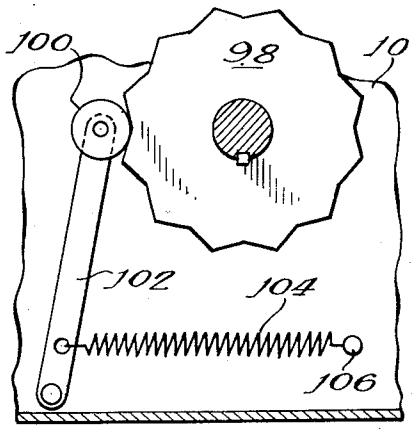


FIG. 4

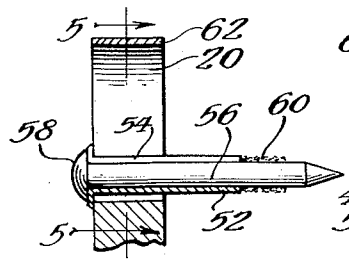


FIG. 5

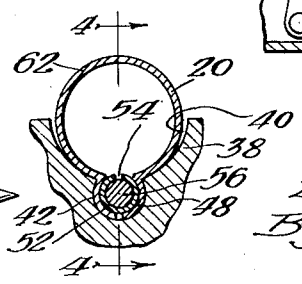


FIG. 17

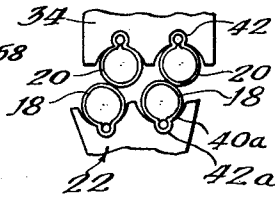


FIG. 19

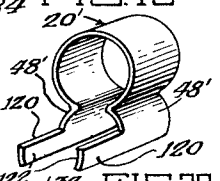


FIG. 20

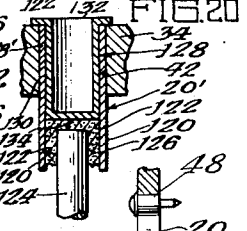
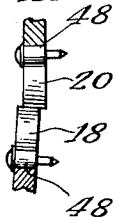


FIG. 18



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SWITCH FOR HIGH FREQUENCY CIRCUIT

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FIG 6

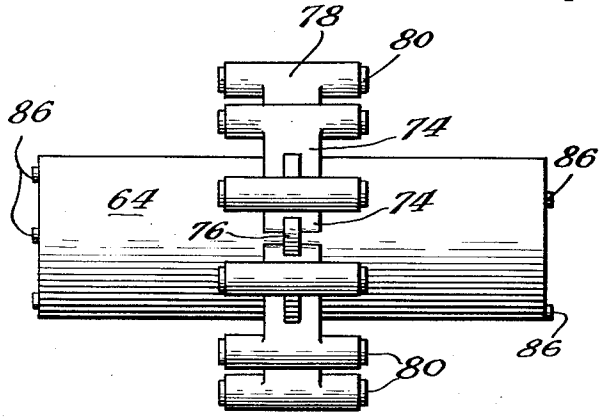


FIG. 7

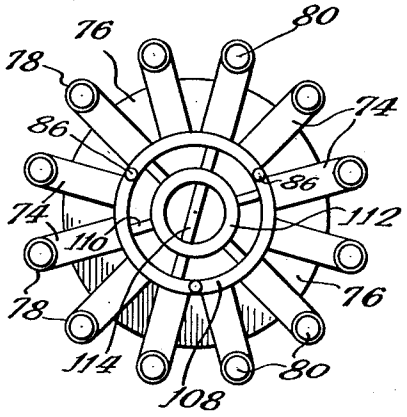


FIG. 8

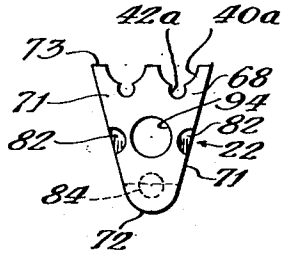


FIG. 9

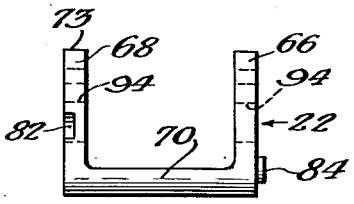


FIG. 10

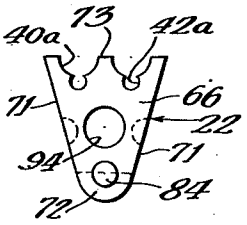


FIG. 11

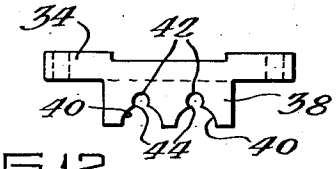


FIG. 12

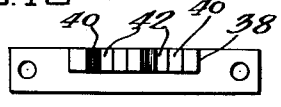


FIG. 13

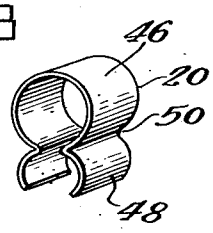


FIG. 14

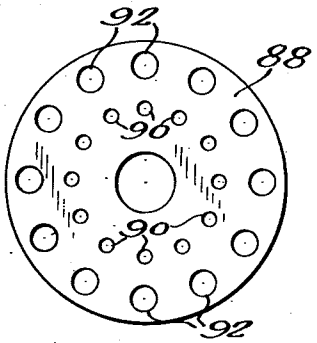


FIG. 15

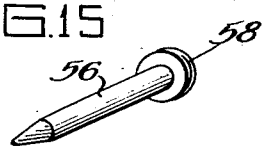
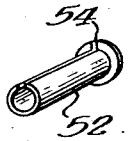


FIG. 16



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Patented June 11, 1957

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SWITCH FOR HIGH FREQUENCY CIRCUIT

Ernest Keller and Edward J. Kubkowski, Chicago, Ill.

Application August 21, 1953, Serial No. 375,750

16 Claims. (Cl. 200—8)

This invention relates to an improvement in electrical switches, and more specifically to an improved turret switch contact construction suitable for use in turning high frequency circuits.

In such high frequency apparatus as television receivers and "boosters" therefor, it is common to tune to various frequencies (commonly known as "channels") by the switching of different tuning components into the resonant circuit, rather than by the variation of the value of a particular component, as is commonly done at lower frequencies. Thus, in tuning from channel to channel in the usual home television receiver or booster amplifier, the tuning is accomplished by switching into the resonant tuning circuit coils which are appropriate and pretuned for the frequencies desired. Thus it is common to provide a coil assembly for each tuned circuit for each channel. The channel selector switch must in general switch into the circuit in any channel position a plurality of tuning elements, since tuning is required not only of a plurality of station frequency tuned circuits but also, in the case of the receiver, of the heterodyne oscillator which is universally employed.

In recent years, the form of switch increasingly used for the above purpose is the "turret" switch, in which the tuning coils are mounted on a rotor and are each provided with a set of contacts which make circuit connection only upon appropriate positioning of the rotor. These tuning coils and contacts are mounted in assemblies (frequently called "tuning strips") which may be removed and replaced, both for purposes of normal servicing and for changing the frequency to which the tuner portion of the television receiver is tuned at any given position of the switch. In some cases all of the tuning elements for a given channel are incorporated in a single replaceable assembly, and in other cases the stationary frequency coils and the oscillator coils are incorporated in separate removable assemblies.

The well known advantages of turret switches have, as stated above, brought them into increasing popularity in commercialy made television receivers and booster amplifiers. However, there are a number of problems which arise in their use and, despite the strides which have been made in devices and techniques for amplification and stable oscillator action at high frequencies, the tuner portion of a television receiver remains one of the most expensive and difficult-to-service portions of the receiver.

One of the chief difficulties encountered with tuner switches of the type employed in television receivers and boosters is difficulty in exact reproduction of the firmness and area of contact of the switch contacts, and of length of the path of currents through the switch. Any impedance change of the switch will affect the resonant frequency to which the circuit is tuned and will also affect circuit losses due to stray capacitance to other elements of the circuit, including ground, as well as signal diminution due to voltage drop across poorly seated contacts. Impedance changes which are negligible at lower frequencies become highly important at the frequencies of modern television.

Turret or other switches for this purpose are provided with indexing means for the purpose of securely and reproducibly engaging the fixed and movable contacts in the various positions for which the switch is designed. With the switches heretofore employed, these indexing means have been a constant source of difficulty both in design and servicing. The maintenance of a constant switch impedance (i. e. exact reproduction of the previous switch impedance each time the switch is returned to the same position) has required extremely accurate indexing. The requirement of such accurate indexing has heretofore imposed upon manufacturers the alternative of either providing extremely strong indexing devices, thus making it difficult for the user to operate the switch and increasing the probability of mechanical failure, or of providing relatively complex and expensive indexing devices. In general, this has resulted in tuners which are either considerably more expensive than they otherwise need be, or which become unreliable after any substantial amount of use and require that the indexing system which "clicks" the switch into position be supplemented by "rocking" of the switch by the user in order to obtain satisfactory reception of television signals. The criticality of exact positioning of the rotor in the switches heretofore employed arose because both the resistance at the point of abutment of the switch contacts and the resistance and inductance of the contacts themselves would change in a substantial degree with any variation in the exact point of contact between the moxing and fixed contacts of the switch.

Another difficulty encountered with the turret switches heretofore employed is that any slight variation or misalignment of the plane of motion of the movable contacts would likewise seriously affect the tuning, for reasons similar to those discussed above in connection with indexing. An additional difficulty encountered with the previous structures is the tendency of the contacts to become deformed with continued use, thus again substantially changing the tuning and efficiency of the high frequency circuits. Furthermore, when the contact members heretofore employed became badly formed it was in general impractical to replace the contacts or to restore them to their original form, it being necessary in such event to replace an entire assembly.

All of these problems have becme particularly acute since the advent of ultra-high-frequency commercial television, in which the frequencies employed are four or more times as great as the frequencies employed in the very-high-frequency band.

The present invention provides a turret tuning switch, for a television receiver, which is extremely low in cost and simple to construct. The structure of the contacts of the switch of the invention assures reproductibility of the tuning with relatively weak indexing, thus eliminating problems of mistuning or of poor contact due to small variations in contact positions. Furthermore, the present invention substantially reduces the necessity of alignment of the movable contacts with the fixed contacts which was heretofore required by providing effective path lengths through the switch contacts which remain substantially constant irrespective of misalignment of the contacts. With the present invention, proper tuning may be obtained with a minimum of expense and without the necessity of frequent servicing or of delicate adjustment of the switch position by the user to supplement the indexing mechanism. Furthermore, the switch contacts of the switch of the invention are capable of long and repeated operation without serious deformation. Additionally, if, after long periods of service, the switch contacts of the present switch should become deformed, they

are readily restored to their original condition by a very simple manipulation. Yet further, the contacts of the present switch may easily be replaced by a serviceman without the necessity of replacing the entire switch, or even of replacing any substantial portion of the switch.

Upon reading of the description of the high frequency turret switch, illustrated in the drawings, which appears below, persons skilled in the art will readily see that many of the features of the switch may readily be adapted to electrical switches of other types and for lower frequencies, although the greatest advantage thereof is achieved in the type of switch discussed above.

For understanding of the invention, reference is made to the appended drawings in which:

Fig. 1 is a view in elevation, partially broken away in section, of a switch embodying the various features of the invention, together with a chasis or housing in which it is mounted;

Fig. 2 is a sectional view of the switch taken along the section line 2—2 in Fig. 1;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 1 in the direction indicated by arrows, and showing in elevation an indexing assembly comprising a portion of the switch;

Fig. 4 is an enlarged detailed sectional view of a switch contact made in accordance with the invention;

Fig. 5 is a sectional view taken along the line 5—5 of Fig. 4;

Fig. 6 is a view in elevation of a unitary hub assembly constituting a portion of the switch of Fig. 1;

Fig. 7 is an end elevational view of the hub assembly of Fig. 6;

Fig. 8 is an end elevational view of a coil retainer segment less coils and coil forms, etc., and constituting a portion of the switch of Fig. 1;

Fig. 9 is a side view of the coil retainer sigment;

Fig. 10 is a view in elevation of the opposite end of the coil retainer segment;

Fig. 11 is a side elevational view of a support member for the fixed contacts which constitute a portion of the switch;

Fig. 12 is a bottom view of the support member;

Fig. 13 is a perspective view of a contact member constituting a portion of the assembly;

Fig. 14 is a view in elevation of a locking plate or indexing member constituting a portion of the switch assembly;

Fig. 15 and Fig. 16 are perspective views of a pin and of a sleeve respectively;

Fig. 17 is a view in side elevation illustrating fixed and movable contacts of the switch slightly out of alignment;

Fig. 18 is an end elevational view of fixed and movable contacts slightly out of alignment, in a different direction from that shown in Fig. 17;

Fig. 19 is a perspective view of a modified form of contact member; and

Fig. 20 is a fragmentary sectional view through a contact assembly using the modified contact of Fig. 19.

The switch is shown as mounted in a rectangular chassis or housing **10**. The switch consists generally of a rotor generally designated by the numeral **12**, and stationary contact assemblies generally designated by the numerals **16** and **17**, secured to the housing **10**. On the periphery of the rotor **12** are a series of individually replaceable coil retainer segments **22** having pairs of contacts **18** and **18*a*** on opposite ends thereof. Each pair of contacts **18**—**18*a*** may be selectively moved into abutment with respective fixed contacts **20** and **20*a*** of the same size and shape. On each coil retainer segment **22** is mounted, in a manner hereinafter to be described a tubular coil form **24** upon which is mounted or wound coils generally designated by the numeral **26**. In the embodiment illustrated, the coils **26** are four-terminal transformers, the two windings **28** and **30** being placed end to end on the core or form **24**, each winding **28** or **30** being connected to its respective pair of contacts **18** or **18*a*** in the manner hereinafter described. It will thus be seen that rotation of the rotor **12** selectively connects the four-terminal coils or transformers **26** to the exterior circuit (not illustrated) through pairs of fixed contacts **20** and **20*a***. Spaced from the switch gang described above on the rotor **12** is an identical second gang **32** which is illustrated only fragmentarily in the drawing. The chassis **10** is apertured at **31** to pass leads extending to the exterior, and at **33** for the mounting of, for example, a tube socket.

The general structure and function of the switch having been thus described, the details of construction and the novel and advantageous features of the present invention may now be described. The fixed contact pair **20** (identical with the fixed contact pair **20*a*** and the fixed contacts of the second switch gang **32**) are mounted upon, and extend from, a contact support member **34** of a suitable insulating material, which is in turn affixed to the chassis or casing **10**, as by screws **36**. This fixed contact support **34** comprises a plate **38** having in the edges thereof concave notches **40**. Adjacent to the noches **40** are cavities or cylindrical bores **42** of smaller dimensions which communicate with notches **40**. The bores **42** are centered at points which are less distant from the edges of the notches **40** than the radius of the cavities or bores **42**, so that there are formed constrictions **44** defining the connecting space between the bores **42** with the notches **40** (Fig. 11). Each contact **20** (Fig. 13) is a flat strip of resilient spring-like contact material, such as silver plated beryllium bronze, the central, outer portion **46** being bent into substantially a ring or circular shape, and the juxtaposed, inner end portions **48** being bent to form together an essentially complete circle of smaller radius, connected by a constricted portion **50** to the larger circular portion **46**. The shape and dimensions of the inner portion **48** of each contact **20** is such as to conform to and be fully seatable in one of the cavities **42**; the outer circular portion **46** of each contact **20** is located partially in one of the notches **40**, with the outermost portion thereof projecting from the notch **40**. The outer circular portion **46** contacts the notch **40** only at the bottom thereof so that it is free of rigid support for substantially more than 90° on either side of the outermost portion of the ring, so as to be flexible in all directions. To this end, the outer portions of each notch **40** is flared slightly outwardly, to space the walls defining the notch from the associated contact.

Through the circle formed by the ends **48** of the contact strip **20** is driven a collar or sleeve **52** (Figs. 4, 5 and 16), which is longitudinally slit at **54**. A pin or lug **56** is driven through the sleeve **52** and spreads the slotted sleeve **52** to clamp the end **48** of the contact **20** between the sleeve **52** and the wall of the aperture **42**. Motion of the pin **56** through the collar **52** is limited by a head **58** on the pin, and relative motion between the pin **56**, and the collar **52** is further prevented by solder **60** at the outer end of the pin **56**, which also serves to tin the pin **56** so that it may readily serve as a terminal for connection of the switch to an external circuit.

The contact assembly described above (and illustrated in detail in Figs. 4, 5, 11, 13, 15 and 16) provides a circular strip contact which is seated securely in a concave seat in the edge of the insulating support member, the outer portion of the contact being supported solely by the inner portion, and being completely free to flex as a unit in all directions. Despite the simplicity and low cost of the making of such an assembly, the contact is not only rugged and long-lasting, but furthermore, the making of a soldered connection to an exterior circuit is simply done without the necessity of further structure. Also, in the event that a contact **20** should become unusable due to mishandling or long use, it may be removed by merely driving out the pin **56** while heating the solder **60**, and a new contact inserted. Inspection of Fig. 5 will additionally show the structural

superiority of the present contact over those previously used as regards the length of life of the contact in service. With the circular configuration shown, strains imposed on the spring contact by the pressure of another contact at the outer edge **62** are distributed with substantial uniformity, so that little bending occurs at any one point. The factor of fatigue, which is the usual life limit of spring contacts, is thus greatly reduced. The seating of the inner half of the ring-shaped contact in the concave notch **0** substantially extends the repeated flexing which the contact will withstand without losing its circular shape and without interfering with the freedom of the outer edge **62** to bend and flex. If, after long usage, the outer edge **62** should become depressed radially to an extent which weakens the firmness of its abutment against corresponding movable contacts, the original firmness of engagement may be restored by merely pinching the contact to restore its original circular shape.

The rotor **12** of the switch comprises a unitary hub **64** on and completely encircling which are mounted the tuning component retainers **22**. The latter (Figs. 8, 9 and 10) are unitary molded cradle-shaped members of polystyrene or other suitable low-loss plastic, and consist generally of front and rear end portions **66** and **68** and an interconnecting web **70**. The ends **66** and **68** are identically shaped, having angularly disposed side edges **71** and straight (except for notching similar to the notching of the stationary contact plate **38**) outer edges **73**.

The shape of the ends **66** and **68** is generally that of a truncated isosceles triangle, the included angle of the edges of the sides **66** and **68** being 360° divided by the number of retainers **22** disposed about the hub **64**. In the illustrated example, there are twelve retainers (each corresponding to the tuning position of one television channel), and the included angle of the edges of the ends **66** and **68** is 30°. In the illustrated embodiment, the truncating edge is rounded off at **72**. There is thus formed an annular assembly of retainer segments **22** surrounding the cylindrical hub **64**, the abutting side edges of the retainer segments **22** lying on extended radii of the hub.

The retainer segments **22** are secured in position on the hub **64** in the manner now to be described. Central of the cylindrical hub **64** and integral therewith are radially extending arms **74**, reinforced by an annular web **76**. At the ends of the arms **74** are longitudinally extending lugs or pins **78**, the ends of which have formed thereon shoulders **80**.

In order to reduce the mass of the system, and thus to render less critical the strength of the required indexing mechanism, the hub **64** is in the form of a hollow cylinder **108** (Fig. 7). Supported centrally of the cylinder **108** by ribs **110** is an inner cylinder **112**, across which extends a rib or key **114**, the inner cylinder **112** and the rib or key **114** accommodating a conventional slotted shaft which may be employed for mounting and rotation of the rotor **12**. The entire hub assembly, including the coaxial cylinders **108** and **112** and the arms **74** and lugs **78**, is molded as a unit.

The end members **68** of the retainer segments **22** have formed in the angularly disposed edges **71** semi-circular recesses **82**. Each circular shouldered end **80** of the lugs **78** is seated in the semi-circular recesses **82** in abutting retainer segments **22**. The shouldered ends **80** of the lugs **78** on the hub **64** and the semi-circular recesses in the ends **68** thus constitute cooperating indexing means positioning the retainers on the hub. Preferably, the recesses **82** are tightly fitted on the lugs **78**, so that the assembly is self-supporting during the installation of the locking means securing the opposite ends of the retainer segments **22** now to be described.

The opposite or outer ends **66** of the retainer segments **22** are provided with lugs **84**, which project just beyond the end of the cylindrical hub **64**. The latter is also provided on the end with lugs **86**, which are thus radially inward of the lugs **84**. The assembly is completed by a locking plate **88** which is apertured with radially spaced apertures **90** and **92**, which tightly receive the lugs **84** and **86** respectively. Due to the wedge action of the truncated isosceles shape of the ends of the retainer segments **22**, the installation of the plate **88** securely locks the entire assembly, further rigidity being added by the fact that the inner edges of the retainer segments **22** abut against the hub **64**, as best shown in Fig. 2. The locking plate **88** is securely held in position by the manner of mounting the rotor in the chassis **10**, in the illustrated embodiment, but obviously any suitable means may be used to secure the locking plate **38** in position. The ends **66** and **68** of the coil retainer segments **22** are bored at **94**, and the conventional tubular cores **85** (Fig. 3) and coil forms **24** are mounted in these apertures.

The ends **66** and **68** are provided with notches **40***a* and apertures **42***a* in all respects identical with the corresponding formation of the plate **38** which supports the fixed contacts **20**. The movable contacts **18** and **18***a* which are mounted on the retainer segments **22** are in all respects identical with the fixed contacts **20** and **20***a* as described above. The abutting contacts **18—18***a* and **20—20***a* are similarly oriented so as to make contact along lines generally longitudinally thereof.

It will thus be seen that rotation of the rotor **12** successively connects the four-terminal coils or transformers **26** into the external circuits (not illustrated) connected to the pins or lugs **56** on the stationary contacts.

Positioning of the stationary contacts **18** in engagement with the fixed contacts **20** is obtained by means of the indexing mechanism generally designated by the numeral **96**. This indexing mechanism is of a conventional, inexpensive type, employing a star wheel **98** and a roller wheel **100**, the latter being journalled on the end of a pivot arm **102**, which is drawn by a tension spring **104** affixed to the chassis at **106**. With the present construction of the contacts **18** and **20**, the simple indexing structure illustrated is easily capable of securing proper and reproducible contact without the necessity of providing an extremely strong spring **104**, which would make tuning difficult for the user, or of frequent adjustment of spring tension.

The ability of the switch to perform efficiently with the simple indexing mechanism is attributable to a number of factors. For one thing, the friction between the fixed and movable contacts is very low, so that the contacts are readily guided into register by a relatively small indexing force. Additionally, as may be seen in Fig. 17, slight misadjustment of the contacts will not substantially change the impedance across the contact assembly. This is in part due to the fact that the contacts, in the event of such misadjustment, adjust themselves in shape to maintain a substantial area of contact, which is not the case where rigid contacts are employed; also, it will be noted that the impedance paths for the radio frequency currents through each contact are parallel impedance paths of comparable length so that misalignment of the contacts will not appreciably vary the mean effective current path length through the contacts. It will be seen that the fact that the contacts are of identical size aids substantially in minimizing the impedance change due to slight misalignment of the contacts.

From Fig. 18 it may also be seen that the present structure will give firm contact over a substantial area despite the fact that the stationary and fixed contacts may be slightly or even considerably misaligned as regards the planes in which the circular contacts are oriented. The fact that the contacting portions of the contacts are free not only to flex radially, which is im-

portant in the type of misadjustment illustrated in Fig. 17, but also are free to flex in other directions, permits substantial misalignment of the type illustrated in Fig. 18 without introducing problems of insufficient contacts area. Thus the precision of mounting of the rotor **12** in its bearings, and similar problems of physical assembly are not nearly so critical in the manufacture of the switch of the invention as is the case with the switches heretofore available.

A modified form of contact **20'** is shown in Figs. 19 and 20. Contact **20'** is similar in all respects to contact **20**, previously described, except for the inclusion of spaced ears or lugs **120** projecting axially from, and being integral with, the opposite inner end portions **48'** of the contact. The ears extend beyond the main body of the contact and have facing concave inner surfaces **122**. When the contact **20'** is placed in a bore **42** in contact support member **34**, and the inner portion **48'** of the contact is constricted by the walls defining bore **42**, as previously described in connection with contact **20**, the ears **120** are brought into closer proximity to each other and define a pocket or confined space within which the end of a lead wire **124** is soldered. The ears **120** project well beyond the side of the support member **34**.

The contact **20'** is secured to the contact support member **34** (or **66** or **68**) by a hollow grommet **128** passing through the circular aperture defined by the inner end portions **48'** of the contact **20'**. The grommet has a hollow cylindrical shank **130** and a peripheral flange **132** which abuts the side portion of contact support member **34** surrounding one end of the bore **42**. The flange **132** is positioned on the side of the contact **20'** opposite ears **120**. The shank **130** of the grommet is press fitted into the circular aperture defined by the confined inner end portions **48'** of the contact and tightly holds the contact against the walls defining the bore **42**.

There is above described two embodiments of the invention. It will readily be seen by those skilled in the art that many modifications of the embodiments disclosed may readily be devised which utilize the teachings of the invention and that these teachings may also be employed in many types of electrical switches other than the turret switch for television tuning herein shown. Accordingly, the scope of the patent protection to be afforded the invention should not be considered to be limited by the particular embodiment shown in the annexed drawings and described above.

What is claimed is:

1. In an electrical switch having a rotary switch contact member and a second contact member being in the path of movement of said rotary switch contact member so as to be engageable therewith, the improved construction wherein the mutually abutting surfaces of said contact members are continuous, convex, inwardly flexible, conductive strips of similar size, shape and orientation, said mutually abutting portions of said strips being spaced a similar amount from the two ends of the associated strip and also being free to flex as a unit in a direction at right angles to the axes of curvature thereof, and an electrical connection to each of said contact members established by means of a conductor joined to both ends of each strip so that the electrical path lengths between said mutually abutting contact surfaces and the connecting conductor associated with each contact member are of similar magnitude.

2. In an electrical switch having a rotary switch contact member and a second contact member being in the path of movement of said rotary switch contact member so as to be engageable therewith, the improved construction wherein the mutually abutting surfaces of said contact members are continuous, convex, inwardly flexible, conductive strips, said mutually abutting portions of said strips being spaced a similar amount from the two ends of the associated strip and also being free to flex as a unit in a direction at right angles to the axes of curvature thereof, and an electrical connection to each of said contact members established by means of a conductor joined to both ends of each strip so that the electrical path lengths between said mutually abutting contact surfaces and the connecting conductor associated with each contact member are of similar magnitude.

3. In an electrical switch having a rotary switch contact member and a second contact member in the path of movement of said rotary switch contact member so as to be engageable therewith, the improved construction wherein the mutually abutting surfaces of said contact members are continuous, convex, inwardly flexible, conductive strips, and an electrical connection to each of said contact members established by means of a conductor joining the ends of each strip at points which are spaced a similar amount from the contact making surfaces thereof, so that the electrical path lengths between said mutually abutting contact surfaces and the connecting conductor associated with each contact member are of similar magnitude.

4. An electrical switch assembly comprising a rotary contact member and a second contact member in the path of movement of said rotary contact member and engageable therewith, the improved construction wherein the contact members comprise similarly orientated strips of conductive material bent into a ring extending substantially 360°, the intermediate portions of said strips being continuous, convex surfaces and forming the outer mutually contacting portions thereof and being spaced a similar amount from the two ends of the associated strip and said rings of conductive material being free of rigid support for substantially more than 90° on either side of the outermost contact-making portions thereof so as to be flexible in all directions, and an electrical connection to each of said contact members established by a conductor joined to both ends of each strip so that the electric path lengths between said mutually contacting portions thereof and the connecting conductors associated with each contact member are of similar magnitude.

5. An electrical switch assembly comprising a rotary contact member and a second contact member in the path of movement of said rotary contact member and engageable therewith, the improved construction wherein the contact members comprise similarly orientated strips of conductive material bent into a ring extending substantially 360°, the intermediate portion of said strips being continuous, convex surfaces and forming the mutually contacting portions thereof, said rings and conductive material being free of rigid support substantially more than 90° on either side of the contact-making portions thereof so as to be flexible in all directions.

6. An electrical switch assembly comprising a rotary contact member and a second contact member in the path of movement of said rotary contact member and engageable therewith, the improved construction wherein the contact members comprise similarly orientated, flat, strips of conductive material bent into a circular ring extending substantially 360°, the intermediate portion of said strips being continuous, convex surfaces, flexible in all directions, and forming the mutually contacting portions thereof.

7. A switch contact assembly comprising a support member having formed therein a notch in a side thereof, a cavity inward of and communicating with the notch, and a constriction of lesser width than the notch and cavity between the notch and cavity and defining the connecting space therebetween, and a contact member comprising a resilient conducting strip having an inner portion seated in said cavity and an outer portion in and projecting from said notch beyond said support members, said outer portion of said conducting strip spaced from the outer portion of said notch so as to be flexible in all directions.

8. A switch contact assembly comprising a rigid support member having an outwardly flaring, concave notch formed on one side thereof, a circular cavity inward of and communicating with the notch, a constriction of lesser width than the notch and cavity and between the notch and cavity defining the connecting space therebetween, a contact member comprising a resilient conducting strip having a circular inner portion conformable to and seated in said cavity, and a continuous, circular convex outer contact-making portion in and projecting from said notch beyond said support member, said outer portion of said conducting strip spaced from the outer portion of said notch so as to be laterally flexible.

9. A switch contact assembly comprising a support member having a recess therein, a conducting contact comprising a conducting strip having a portion substantially conforming to and seated in the contour of at least the inner portions of said recess, a split sleeve conforming to the contour of, and seated in, said portion of said conducting strip, and a pin extending through the sleeve to clamp the contact between the sleeve and the support member and provide a circuit connection for the contact.

10. A switch contact wherein the outer contact-making portion thereof is part of a resilient conductive ring, the contact-making portion being free of rigid support so as to be inwardly flexible and a lug means projecting axially beyond the main contact body in a direction parallel to the axis of said ring, said connecting lug means being made of a conductive material and being electrically connected to said conductive ring and acting as a connecting terminal for the contact.

11. A switch contact assembly comprising a contact support member having a recess therein with a generally circular under portion, an electrical contact comprising a conductive strip having a generally circular inner portion substantially conforming to and seated in at least the inner portion of said recess, the outer portion of said strip projecting beyond the outer extremities of said recess, a connecting terminal comprising an axially extending conductive means projecting axially beyond the main body of the contact strip, a hollow, cylindrical sleeve seated within the said curved inner portion of said conductive strip and compressing the strip against the circular walls of the support member defining said recess to anchor the contact thereto.

12. A switch contact assembly comprising a support member having formed therein a notch in a side thereof, a cavity inward of and communicating with the notch, and a constriction of lesser width than the notch and cavity between the notch and cavity and defining the connecting space therebetween, and a contact member having an inner portion seated in said cavity and an outer portion in and projecting from said notch beyond said support members, said outer portion of said contact

member spaced from the outer portion of said notch so as to be flexible in all directions.

13. A switch contact assembly comprising a rigid support member having a notch formed therein, a cavity located inwardly of and communicating with the notch, a constriction defining a connecting space between the notch and the cavity, and a resilient contact member having an inner portion conformable to and seated in said cavity and a continuous, convex, outer contact-making portion projecting from said notch beyond said support member, said outer portion of said contact member being spaced from the outer portion of said notch so as to be laterally flexible therein.

14. A switch contact comprising a bent strip of metal having an outer ring-shaped contact-making portion formed from an intermediate portion of said strip and an inner convex portion formed by the opposed, inwardly curved ends of the strip, said inner portion connecting with said outer portion through constrictions which are spaced apart a distance substantially less than the diameter of said outer, ring-shaped portion.

15. A switch contact assembly comprising a support having a recess therein, a contact member having an outer contact-making loop of conductive material and an inner convex portion connecting with said outer portion through constrictions which are spaced apart a distance substantially less than the distance across said outer loop portion, and means anchoring said inner portion within said recess so that the outer loop portion may be bodily flexed relative to said inner portion.

16. In an electrical switch having a rotary switch contact member and a second contact member in the path of movement of said rotary switch contact member so as to be engageable therewith, the improved construction wherein the said contact members are respectively flexible loops of conductive material, and electrical connections to each of said contact members which form parallel current paths to the mutually abutting surfaces thereof, said electrical connections joining said contact members at points which are spaced a similar amount from the said contact-making surfaces thereof so that the electrical path lengths between said mutually abutting contact surfaces and the electrical connections associated therewith are of similar magnitude.

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